

## REMARKS

The specification (including the Abstract) of the patent application has been rewritten to comply with U.S. patent practice. This involved reformatting the specification, for example, to include appropriate section headings. No new matter has been introduced.

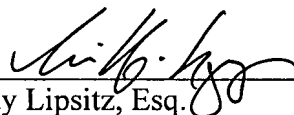
A substitute specification marked to show changes made relative to the original specification (i.e., the English translation of International Application PCT/EP2004/007647 filed with the PTO on January 25, 2006) is attached hereto. The substitute specification includes no new matter. A clean version (without markings) of the substitute specification is also attached.

Claims 1-8 were originally presented. Claims 1-8 have been amended to place them in appropriate U.S. patent claim format. New claim 9 has been added. No new matter has been introduced.

Applicant respectfully requests that this Preliminary Amendment be entered prior to substantive examination of this patent application.

No fee is believed due. Please charge any fee deficiency to Deposit Account No. 50-0540.

Respectfully submitted,

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~~Pressurized medium consumer device~~ **PRESSURIZED MEDIUM CONSUMER  
SYSTEM**

**BACKGROUND OF THE INVENTION**

The present invention relates to an improved pressurized-fluid-consuming system employing pressurized-fluid consuming devices~~device according to~~ claim 1.

~~Such~~ In the automotive engineering field, pressurized-fluid-consuming devices are ~~known~~ conventionally employed in automotive engineering in the form, for example, of service-brake systems, trailer-brake systems, parking-brake systems or air-suspension systems. Such ~~pressurized fluid consuming~~ devices draw the needed pressurized fluid from one or, frequently, also from a plurality of pressurized-fluid storage reservoirs. To fill ~~the~~ a pressurized-fluid storage reservoir with ~~the~~ pressurized fluid, ~~there is usually provided~~ a pressurized-fluid supply device is typically provided. When compressed air, for example, is used as the pressurized fluid, the pressurized-fluid supply device is provided in known manner with a compressor, an air dryer, a pressure regulator and, for separation of individual compressed air circuits, a multi-circuit protective valve. Such a compressed-air supply device can also be equipped with an electronic controller, as ~~known~~ described, for example, ~~from German Patent 10004091~~ in DE 100 04 091 C2. The electronic controller ~~then takes over~~ assumes the functions of the pressure regulator and of the conventional multi-circuit protective valve ~~of conventional type~~ in conjunction with suitable sensors and actuators. ~~In other~~

~~words~~ That is, the electronic controller ~~then contains~~ serves a multi-circuit protective function.

When ~~the aforesaid~~ pressurized-fluid-consuming devices of the type noted above are used in a vehicle, safety reasons dictate that any ~~pressurized-fluid-consuming~~ such devices whose availability does not influence, or only slightly influences, operation of the vehicle ~~only slightly or not at all~~ in a manner critical to safety cannot affect the function of other pressurized-fluid-consuming devices whose availability influences operation of the vehicle in a manner critical to safety, ~~as they might do, for example (e.g., through rapid pressurized-fluid consumption).~~ The brake system of a vehicle ~~represents~~ is an example of a system employing pressurized-fluid-consuming devices with having consequences that are particularly critical to safety if ~~its~~ the availability of such devices is limited; and an air-suspension system ~~represents~~ is an example of a system employing pressurized-fluid-consuming devices with having consequences that are only slightly critical to safety.

In the case of vehicles with a compressed air brake system, in conformity with EU Directive 98/12, ~~in particular is to be complied with in this connection.~~ In particular, ~~in order to satisfy Paragraph 2.2.1.16 of Appendix I of the aforesaid Directive,~~ it is known that certain groups of compressed air-consuming devices ~~must each be~~ are provided with ~~its~~ their own compressed air storage reservoir. ~~In the normal case~~ Normally, for example, the brake system uses one compressed air storage reservoir for the front-axle brake circuit and a separate compressed air storage reservoir for the rear-axle brake circuit. In addition, separate compressed air storage reservoirs are provided for each of the other compressed air consumers, such as, for example, the ~~aforesaid~~ air-suspension system. The intention is to ensure ~~hereby~~ that the

secondary consumers ~~mentioned~~ identified in EU Directive 98/12, ~~or in other words that~~ is, those consumers such as the air-suspension system that do not belong to the service-brake system of the vehicle, do not undesirably reduce the compressed air reserves stored in the compressed air storage reservoirs of the service-brake system to such an extent that, by their operation, ~~that~~ adequate braking capacity of the vehicle is jeopardized. The known approach of providing separate compressed air storage reservoirs for a plurality of compressed air circuits is associated with high costs and great complexity ~~during installation~~ of the compressed air system in a vehicle.

### SUMMARY OF THE INVENTION

~~The object of the invention is therefore to provide a~~ Generally speaking, in accordance with the present invention, an improved pressurized-fluid- consuming device, ~~whose use permits the design of a less complex and less expensive pressurized-~~ fluid-system is provided that overcomes disadvantages associated with conventional systems.

~~This object is achieved by the invention specified in claim 1.~~  
~~Improvements and advantageous configurations of the invention are specified in the~~ dependent claims.

The present invention has the advantage that, by use of ~~the inventive a~~ a pressurized-fluid- consuming device as a secondary consumer ~~within the foregoing~~ meaning, it is possible to dispense with a separate pressurized-fluid storage reservoir for this secondary consumer. To supply the pressurized-fluid- consuming device with pressurized fluid, it can then be simply connected, via a multi-circuit protective function used for decoupling the individual pressurized-fluid circuits in the manner of a multi-circuit protective valve of conventional type, to other pressurized-fluid storage

reservoirs, such as the pressurized-fluid storage reservoirs of the service-brake system, which ~~must be~~ are present in any case, (for example, to satisfy EU Directive 98/12). ~~Hereby~~ As a result, the costs ~~for~~ associated with the eliminated pressurized-fluid storage reservoir as well as for corresponding pressurized-fluid lines needed for connection thereof can be saved. In addition, ~~costs~~ cost and time ~~for~~ with respect to installation of the pressurized-fluid system can be saved. A further advantage is that the regulations of EU Directive 98/12 are ~~then~~ automatically satisfied (~~In this connection, the~~ inventive pressurized-fluid-consuming ~~device~~ system automatically ensures compliance with ~~these~~ these regulations, without the need to take further provisions of ~~these regulations~~ into consideration in designing the pressurized-fluid system of the vehicle). A further advantage is that overflow valves that may have been present together with such secondary consumers can be dispensed with.

~~In an advantageous configuration~~ one embodiment of the present invention, several physical variables, such as the pressure in the pressurized-fluid storage reservoir or the quantity of air contained therein or the mass of air contained therein or the energy stored therein can be used as ~~the~~ a value of state. This has the advantage that a physical variable that may have already been determined by means of sensors for other purposes can be used by the inventive pressurized-fluid-consuming ~~device~~ system. The use of pressure as the value of state has the advantage that a pressure sensor can be used for sensing, an approach which is ~~a~~ relatively inexpensive.

Still other objects and advantages of the present invention will in part be obvious and will in part be apparent from the specification.

The present invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be

exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be ~~explained~~described in more detail hereinafter and further advantages will be pointed out on the basis of a ~~practical example and a drawing~~the accompanying drawing, wherein:

Fig. 1 ~~shows~~is a schematic diagram of a pressurized-fluid system with ~~inventive~~pressurized-fluid consuming devices disposed therein in accordance with an embodiment of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

~~In~~Referring now to Fig. 1, where pressurized-fluid lines are represented by solid lines and electrical lines by broken lines, ~~It will be assumed hereinafter that the pressurized-fluid system according to Fig. 1 is used in a vehicle.~~

~~A~~ there is shown a pressurized-fluid supply device (1) ~~is provided with~~ pressurized-fluid discharge ports (2, 3, 4), which ~~via pressurized-fluid lines~~ are in communication with pressurized-fluid storage reservoirs (8, 9, 10) via pressurized-fluid lines. Pressurized-fluid-consuming devices (11, 12, 13) are provided in communication with pressurized-fluid storage reservoirs (8, 9, 10) via pressurized-fluid lines. The pressurized-fluid-consuming devices (11, 12, 13) ~~are~~can be, for example, a service-brake circuit (11) of the front axle, a service-brake circuit (12) of the rear axle and a brake circuit (13) for a trailer, respectively.

Pressurized-fluid supply device (1) is provided with a multi-circuit protective function, which is used for decoupling the ~~aforesaid~~ pressurized-fluid

circuits (11, 12, 13) and which satisfies the function of a known multi-circuit protective valve. Such a multi-circuit protective function as well as a specific configuration containing pneumatic valves is ~~known~~described, for example, ~~from~~in German Patent DE 196\_22\_095 A1.

Pressurized-fluid supply device (1) is provided with further pressurized-fluid discharge ports (20, 21), to which there are respectively connected, via respective pressurized-fluid lines, a first ~~inventive~~ pressurized-fluid-consuming device (14) and a second ~~inventive~~ pressurized-fluid-consuming device (15). First ~~inventive~~ pressurized-fluid-consuming device (14) can be placed in communication with pressurized-fluid storage reservoir (9) via the multi-circuit protective function, and second ~~inventive~~ pressurized-fluid-consuming device (15) can be placed in communication with pressurized-fluid storage reservoir (8) via the multi-circuit protective function. Pressurized-fluid-consuming devices (14) or (15) can be designed, for example, as a vehicle level-control systems ~~for a motor vehicle~~.

~~In an advantageous configuration~~ According to one embodiment of the present invention, pressurized-fluid supply device (1) and, if necessary, pressurized-fluid-consuming devices (11, 12, 13) are each provided with an electronic controller as well as with a port for a data bus. ~~According to an advantageous configuration, the~~ data-bus ports can be ~~are~~ connected to one another via a data bus (16), such as, for example, a controller area network ("CAN") bus ~~(CAN = controller area network)~~.

~~In an advantageous configuration of the invention,~~ Each of first and second pressurized-fluid-consuming devices (14, 15) ~~are each~~ can also be equipped with an electronic controller and with a data bus port (18, 19) ~~for the data bus~~. Devices (1, 11, 12, 13, 14, 15) can exchange data with one another over data bus (16).

Pressurized-fluid supply device (1) is connected via electrical lines to pressure sensors (5, 6, 7), each of which is in pneumatic communication with pressurized-fluid storage reservoirs (8, 9, 10). ~~and senses~~ The sensors sense the respective pressures in pressurized-fluid storage reservoirs (8, 9, 10) and transmits ~~it~~ this information as a pressure signals to pressurized-fluid supply device (1). Pressure sensors (5, 6, 7) can also be integrated into pressurized-fluid supply device (1). Pressurized-fluid supply device (1) transmits the pressure signals of pressure sensors (5, 6, 7) over data bus (16).

It is also advantageous to connect pressure sensors (5, 6, 7) via the electrical lines to another device in the vehicle, such as an electronics unit of the instrument panel. In compressed air-braked motor vehicles, it is customary to mount indicator instruments in the instrument panel for indication of the pressure present in pressurized-fluid storage reservoirs (8, 9, 10), so as to inform the operator of the motor vehicle about the current pressure values. For this purpose, the instrument panel, or the electronics unit of the instrument panel used to control indicator functions of the instrument panel, is connected to the pressure sensors. ~~Advantageously~~ Preferably, the electronics unit of the instrument panel is designed such that it is also connected to data bus (16) and ~~that it transmits~~ the pressure signals of pressure sensors (5, 6, 7) over data bus (16) to pressurized-fluid supply device (1) and, if necessary, to other receiving devices.

~~According to an advantageous configuration of the invention~~ Preferably, first and second pressurized-fluid-consuming devices (14, 15) are ~~capable of receiving~~ constructed and arranged to receive pressure signals from data bus (16).

According to an advantageous ~~configuration~~ embodiment of the present



invention, pressurized-fluid-consuming device (1), or the electronics unit of the vehicle instrument panel, transmits the pressure values determined by pressure sensors (5, 6, 7) onto data bus (16) in the form of pressure signals of the respective pressurized-fluid storage reservoirs (8, 9, 10). First and second ~~P~~pressurized-fluid-consuming devices (14, 15) receive and evaluate these pressure signals. Predetermined minimum pressure values are programmed into first and second ~~pressurized-fluid-consuming devices (14, 15), there are programmed respective predetermined minimum pressure values, with which they compare the~~ These predetermined values are compared against respective received pressure signals. For this purpose, microprocessors that execute a resident program are provided in the electronic controllers of first and second ~~pressurized-fluid-consuming devices (14, 15). During execution of the program, the~~ aforsaid comparison ~~between~~ of the predetermined minimum pressure value and the received pressure signals is performed.

If, ~~it is found during this process, that the pressure value indicated by the pressure signal does not reach~~ is below the predetermined minimum pressure value ~~and thus is below that value,~~ the electronic controllers of pressurized-fluid-consuming devices (14, 15) prevents pressurized-fluid-consuming devices (14, 15) from drawing any pressurized fluid from respective pressurized-fluid storage reservoir (8, 9). Only when the predetermined minimum pressure value is reached or exceeded does the electronic controllers permit the drawing of pressurized fluid on demand. The other functions of pressurized-fluid-consuming devices (14, 15) that can be performed even without drawing of pressurized fluid are performed even ~~if~~ when the pressures are below the minimum value.

Pressurized-fluid-consuming device (11) is also connected via an

electrical line to a speed sensor (17). The travel speed of the vehicle can be determined from the signal of the speed sensor. Pressurized-fluid-consuming device (11) receives the signal of speed sensor (17) and transmits a speed signal corresponding to this value of speed onto data bus (16). First and second ~~P~~pressurized-fluid-consuming devices (14, 15) receive and evaluate the speed signal from data bus (16). ~~If as a result there is detected~~ a vehicle speed slower than a predetermined minimum speed value of speed is detected, for example close to vehicle standstill, first and second pressurized-fluid consuming devices (14, 15) then draw pressurized-fluid from pressurized-fluid storage reservoirs (8, 9) on demand even if the pressure is below the predetermined minimum value.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above constructions without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is: